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Performing detailed check procedures is an important part of the daily routine of operators of sophisticated mechanical and electronic equipment. Check procedures contain technical vocabulary, specialized structures and basic technological concepts, all of which are unfamiliar to many foreign operator trainees. The article proposes the inclusion of check procedures in a technical English course designed to be taken by these trainees after their general English training and before substantive operator training. The nature of the check procedure is discussed and its role in a technical English course is examined. Certain problems in teaching the procedure are considered, including teacher orientation, the abstractness of the procedures, and the need for special instructional routines. Solutions for these problems are proposed, and detailed routines for introducing and reviewing a check procedure in the English classroom are given. (Author/MSE)

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Performing detailed check procedures is an important part of the daily routine of operators of sophisticated mechanical and electronic equipment. Check procedures contain technical vocabulary, specialized structures and basic technological concepts, all of which are unfamiliar to many foreign operator trainees. This article proposes the inclusion of check procedures in a technical English course designed to be taken by such trainees after completing their general English training but before going into substantive operator training. The nature of the check procedure is discussed, and its role in a technical English course is examined. Certain problems involved in teaching a check procedure are considered, including teacher orientation, the abstractness of check procedures and the need for special instructional routines. Solutions are proposed for these problems, and detailed routines are given for introducing and reviewing a check procedure in the English classroom.

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The Check Procedure in a Technical English Training Course*

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This article is an outgrowth of two technical English materials preparation projects in which he participated. The texts which resulted from these projects are currently in use in the Middle East.

Introduction

A growing area of concern in the ESOL field is the teaching of technical English to potential operators of sophisticated mechanical and electronic equipment. Because of differences in cultural and educational traditions as well as language, the students need to be trained not only in vocabulary and specialized structures appropriate to their eventual technical area, but also in various concepts which underlie the operation of the equipment and, in a very superficial sense, its construction.

Before entering technical English training, the students should have completed an intensive course in general English

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structure and vocabulary usage. This provides a foundation on which to build. After completing their technical English course, they should then proceed into their substantive operator training. The technical English course thus is an important transition program which helps the students to prepare to understand the equipment manuals and to communicate with American instructors during their operator training.

The operation of sophisticated mechanical and electronic equipment almost always requires the following of detailed check procedures. Examples of such procedures are the various step-by-step lists of instructions which must be run through in order to operate a complex aircraft (such as an air liner), and the daily checks used to determine the readiness and functional integrity of a radar set. Such check procedures invariably include specialized vocabulary, structures and concepts. Examples of vocabulary (for an aircraft) include <u>flaps</u>, <u>landing gear</u>, and <u>cabin pressure</u>; examples of structures include <u>press test lamp</u>, and <u>cycle propeller high-low-high</u>. Examples of concepts are the difference between turning a crank clockwise and counter-clockwise, and the cause/effect relationship between engaging the starter and the cranking of the engine which results. In fact, the act of following a check procedure itself is a concept foreign to many students, representing as it does technology common to various Western cultures but unfamiliar to a

desert-dwelling Arab, say, or an Iranian villager. And it is from such traditional segments of a society that potential operator trainees are often drawn. Learning to work with check procedures, then, becomes an important goal in the technical English training of potential equipment operators.

What is a Check Procedure?

Before discussing the role of the check procedure in a technical English course, it is worth taking a few moments to discuss the nature of the check procedure, and to look at some examples. As stated above, a check procedure is a step-by-step list of instructions. These instructions must be followed, systematically, in order to accomplish a specific task. It is usually necessary that the instructions be followed in the order given, and that no instruction be ignored.

Check procedures vary widely in format and in degree of formality. An example of an informal check procedure, which because of its informality requires considerable familiarity with the equipment, is the following (which may be used to start the engine of one kind of light aircraft):

Check Procedure I

Carburetor Heat - COLD

Mixture - RICH

Propeller - HI RPM

Throttle - CRACKED

Prime - AS NEEDED

Master Switch - ON

Propeller Area - CLEAR

Starter - ENGAGE

Oil Pressure - CHECK

Omitting certain of these instructions (for example Master Switch - ON, which makes available the electrical power to operate the starter) may result in the engine not starting. Similarly, taking certain instructions out of sequence (for example, sequencing [Fuel] Mixture - RICH after Starter - ENGAGE) may give the same result. Further, the reader who is not a pilot will note that certain vocabulary, structures and concepts need explanation. Since this is true even if the reader is a native speaker of English, the extent of the problem for non-native speakers can readily be imagined.

More formalized check procedures must often be used where the equipment is more complex. Consider the following check procedure, which might be part of the daily check for a hypothetical piece of electronic equipment:

Check Procedure II

Location	Action	Indication
At Control Panel I	1. Main Circuit Breaker (1,Fig 1)	ON
	2. Console Power Switch (6,Fig 1)	ON
	3. Lamp Dimmer Control (3,Fig 1)	Fully CW
	4. Depress High Voltage Warning Lamp (5,Fig 1)	Lamp Illuminates
	5. Set Test Switch (2,Fig 1) to	ZERO Test Lamp (4,Fig 1) Illuminates

Again, all instructions must be followed in the order indicated. Note the column headings (Location, Action, Indication), and the detailed nature of some of the instructions. The numbers in parentheses refer to corresponding numbers on a specific illustration (line drawing or photo) in the equipment operator's manual. Such numbers are often referred to as "callout numbers".

As in the case of Check Procedure I, vocabulary (including here an abbreviation), structures and concepts need explanation. Note also that the column headings do not always describe explicitly the information found below them: Main Circuit Breaker, for example, in Instruction 1, is not an action but the name of a part of the equipment. Vagueness and lack of consistency in language usage are not uncommon in published check procedures. Nevertheless, because the instructions tend to be more detailed, such procedures are easier to follow (assuming the operator has the appropriate illustration in the manual to refer to).

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The Check Procedure as Part of a Technical English Course

Reading and following check procedures is an important part of the daily routine of an operator of sophisticated equipment. Since many of his problems in this regard relate directly to language usage and extremely basic technological concepts, it is desirable that the basic skills of how to read and follow such procedures be taught to the trainee prior to the time he enters into substantive operator training. Perhaps the best way to do this is to include check procedures in a technical English course.

Let's assume an intensive six or seven hour per day, five day per week technical English course, taught to a group of students all of whom come from the same language (and roughly the same cultural) background, and all of whom will enter operator training after they finish their technical English study. They are entering technical English training after successfully completing an intensive general English course, which has given them a fairly good knowledge of basic English vocabulary and structures.

The technical English course could include one or two check procedures as part of each day's lesson material--analogous in part to the dialogs often used in other English courses. During the first week or so of the course these procedures should be simple, and specially-written to make use of objects found in the classroom or in the possession of the students. The following check procedure, which makes use of a pencil sharpener, will serve as an example:

Check Procedure III

Location	Action	Indication
At the Pencil Sharpener	1. Examine pencil to determine end to be sharpened	End determined
	2. Insert pencil into sharpener	Pencil inserted
	3. Apply slight pressure inward	Pressure applied
	4. Turn handle of sharpener clockwise	Pencil sharpens

Such check procedures should be kept as simple as possible, as their primary function is to teach the basic concept of a check procedure. Note that specific technical vocabulary, structures and concepts can be used, as they are to some extent in this procedure. However, the teaching of such usage is secondary to the teaching of the basic concept at this very early stage in the course.

As the course progresses further, check procedures should be excerpted from equipment manuals, preferably the operator manuals that the students will use in their operator training course. These check procedure excerpts can be chosen and sequenced so as to present fairly systematically, from the easier to the more difficult, actual vocabulary, structures and concepts that the students will need to know during their later training. For example, one procedure might consist of instructions to depress a series of lamps (press a series of buttons containing light bulbs), while observing to see whether each lamp illuminates when

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depressed. Such a procedure would teach lamp, the names of the lamps (as labelled on the control panel), the verbs depress and illuminate, the structure Depress + Noun-Phrase, and the cause/effect relationship between depressing a lamp and its consequent illumination.

A problem that will be uncovered when excerpting check procedures from equipment manuals involves various types of inconsistency and vagueness, such as appear in Check Procedure II, above. Weaknesses of this kind in a check procedure are particularly annoying to an English teacher, who feels an instinctive need to correct the English. Yet to do so would not be entirely fair to the students, who after all will have to work with the manuals as they are printed, once the technical English course is over. Perhaps the best way to handle this situation is to present the first few equipment-manual check procedures in two forms: the first edited, and the second as the procedure actually appears in the manual. This will help wean the students from the controlled usage of the English classroom to the less controlled usage of operator manuals and technical instructors.

Teaching a Check Procedure

Once the decision is made to include check procedures in a technical English course, it is necessary to consider how they should be taught. Perhaps the major problems which come to mind are the following:

1) The average English teacher is not qualified in the particular technical area to which the procedures relate.

2) A check procedure written on a piece of paper is really quite abstract, and experience has shown that the average non-Western operator trainee has trouble coping with technological abstraction of any sort.

3) Specific instructional routines need to be evolved to teach the procedures.

1) The English Teacher. Let's consider the teacher first. In order for any teacher to teach check procedures, it is essential that he familiarize himself in general with the equipment, the relationship of the check procedures to that equipment, and to a limited extent the overall technical field. At the minimum, he should have available a set of the equipment manuals from which the check procedures have been excerpted, and he should be strongly encouraged to study them. It is extremely helpful also if one of the technical instructors who will teach the students later in their operator course can be available to answer questions, and perhaps give one or more talks about the general nature of the equipment and its function. The task of orienting the teachers is not as formidable as it may seem, however (assuming the students have no previous knowledge about the equipment). The teachers' goal will not be to teach the students how the equipment functions, but to prepare them to receive training from

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technically-qualified instructors in how to operate the equipment. Thus, for example, a student does not need to be taught the function of the High Voltage Warning Lamp on a control panel, but simply how to locate and identify that component on the panel and, in a general sense, how to depress a lamp and observe the result.

2) The Abstractness of the Check Procedure. This problem is best solved by a combination of training aids and instructional routines using those aids. The earliest check procedures in the course should relate directly to objects physically present in the classroom (light switch, door knob, pencil sharpener, furniture, etc.). Abstraction is not a significant problem, here, as the student can see, touch and manipulate the objects as required by the check procedures, and observe the result of each step directly rather than having to imagine it. This allows him to focus on the concept of the check procedure itself, with a minimum of interference from other problem areas.

The procedures taken from the equipment manuals, on the other hand, pose more of a problem. Let's assume that the equipment check procedures in the course relate directly to a number of control panels, each one equipped with an array of switches, buttons, meters, circuit breakers, handwheels and other components. What is required here are visual aids. Experience has shown the following to be a good combination:

a) An illustration in the text to accompany each check procedure. This should be either a line drawing or a photo of the actual control panel, reproduced so that the labels of the switches, meters, etc. are clearly legible. Photos are preferable to drawings, because they are less abstract. Each component on the illustration should be identified by a number (a so-called callout number), with the numbers used in the check procedure corresponding to some of the numbers in the illustration. Sometimes an illustration from the equipment manual can be reproduced for this purpose.

b) A transparency for an overhead projector duplicating the illustration in the text, including callout numbers.

c) A transparency for an overhead projector depicting the same control panel, but without the callout numbers. In both transparencies the labels of the components on the control panel must be clearly legible when projected on a screen.

d) If feasible (but not absolutely necessary), one or more mock-up control panels. These should depict the panel(s) which relate to the last few check procedures used in the course. A mock-up can be made by mounting an enlarged photo (life-size, preferably) of a panel on plywood or some similar material about 1/2 inch thick. If possible, holes should be drilled, and actual components (spare parts from the equipment) attached. Only those manipulable components (switches, etc.) used in the excerpted check procedures need be provided.

3) Instructional Routines. The following routines can be taken as a starting point. Experience has shown that they are generally adequate for a course such as is discussed here. Modifications may have to be made, of course, because of limitations in classroom time, lack of some of the visual aids, or the peculiarities of the individual class of students.

Introduction of a Check Procedure

1. Pronunciation Model. The teacher reads the check procedure out loud; the students follow in their books silently.

2. Performance Model. The teacher projects a transparency on the screen, choosing the transparency for the correct panel which includes the callout numbers. He then stands beside the projected image and reads the check procedure out loud, identifying each component and simulating the performance of the instructions. For example, if an instruction reads:

Lamp Dimmer Control (3,Fig 1) Fully CW

the teacher locates callout number 3 on the projected image, uses the number to locate and identify the Lamp Dimmer Control, and simulates turning the control clockwise (CW).

3. Explanation of new vocabulary, structures and basic technological concepts. Using the projection, the teacher explains the new items and concepts. The students should be encouraged to ask questions at this time, but the teacher should not try to give

involved explanations which lead beyond his level of competence. The students will receive advanced technical information about the equipment later, during their operator training.

4. Choral repetition of new or difficult words and phrases. Double repetition.

5. Performance Practice. The teacher asks two students to stand in front of the class, beside the projected image. One student reads the check procedure instruction by instruction, while the other student simulates the actions on the projected image. The student simulating the actions may also use his book, if necessary.

6. Repeat Step 5 until time runs out. After several students have performed the check procedure, the teacher can try using the transparency of the same panel without callout numbers. Ideally, each student should perform each check procedure twice: once as reader and once as actor.

Review of a Check Procedure

1. Performance Model. The teacher projects the transparency of the panel with callout numbers. The students have their books open to the illustration of the panel. The teacher reads through the check procedure, simulating the actions on the projected image.

2. Ask for and answer questions on vocabulary, structures and basic technological concepts. The teacher should use the projected image as needed, being careful to avoid overly-involved explanations.

3. Choral repetition of difficult words and phrases. Double repetition.

4. Identification of equipment and parts. The teacher exchanges the transparency for its counterpart without the callout numbers. He then asks the students to identify the panel and the major components used in the check procedure.

5. Performance Practice. Using the transparency from the previous step, or the mock-up console if available, the teacher asks two students to simulate performance of the check procedure. One student reads and the other acts out the instructions. Only the reader should have a book, and of course there are no callout numbers to aid the actor.

6. Repeat Step 5 until time runs out. If time permits, each student should perform the check procedure twice: once as reader and once as actor.

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